Telescience Resource Kit (TReK)

TReK Review Package

May 9, 2019

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544-1535

Package Contents

- Background
- Information About This Review
- TReK 5.2.0 Content
- TReK Beta Software Testing Program
- RID Process
- Requirements

Information About This Review

- Review Purpose
  - Provide an opportunity to review the TReK 5.2.0 requirements and software.
  - Provide an opportunity to test drive a beta version of the TReK 5.2.0 software.

- Review Package Contents
  - TReK Requirements included at the end of this package.
  - TReK Software included in TReK 0.10.0 Beta Software Package.

- Review Time Period
  - RID Process: RIDs will be accepted between 5/9/2019 and 5/23/2019.
  - TReK 0.10.0 Beta Software Review: 5/9/2019 – 5/31/2019.

For more information about TReK please visit the TReK Web Site: https://trek.msfc.nasa.gov.

TReK 5.2.0 Content

Software	Description
CFDP Application	Provides capabilities to perform file transfer functions using the CCSDS File Delivery Protocol (CFDP). This application has a graphical user interface. You can choose to use Native CFDP (CFDP using UDP) or ION CFDP (CFDP over BP). Added FIPS 140-2 compliant cryptography services. Added support for file fragmentation.
CFDP Console Application	Provides capabilities to perform file transfer functions using the CCSDS File Delivery Protocol (CFDP). This application is a console application targeted for use onboard ISS. It was provided to serve two purposes: (1) a CFDP console application for customers to use right out of the box, and (2) an example program showing customers how to use the CFDP Library to perform common CFDP functions. You can choose to use Native CFDP (CFDP using UDP) or ION CFDP (CFDP over BP). Added FIPS 140-2 compliant cryptography services. Added support for file fragmentation.
CFDP Library	Provides an application programming interface to perform file transfer functions using the CCSDS File Delivery Protocol (CFDP). It includes support for CFDP over Bundle Protocol. You can choose to use Native CFDP (CFDP using UDP) or ION CFDP (CFDP over BP). Added FIPS 140-2 compliant cryptography services. Added support for file fragmentation.
Command Application	Provides capabilities to update, send, and track commands. Includes support for various types of command destinations including POIC, Suitcase Simulator, PRCU, RAPTR, and UFO. It includes the command bridge capability. This application has a graphical user interface.
Command Library	Provides an application programming interface to update, send, and track commands. Core library is C++ with Release 3 compatible wrappers for ANSI-C and .NET.
Crypt Application	Provides the capability to generate cryptography keys for use with cryptography services in TReK applications and libraries.
Data Application	Provides capabilities to receive, process, record, and forward data. This application has a graphical user interface. Added FIPS 140-2 compliant cryptography services.

TReK 5.2.0 Content Continued

Software	Description
Data Library	Provides an application programming interface to create, populate, build, and decompose packets. Includes support for pre-defined and custom headers and packets. Added support for switching, multi-syllable parameters, and formats.
Device Services Library	Provides an application programming interface to perform functions such as creating sockets, sending data, receiving data, etc. Includes support for Bundle Protocol. Added support for FIPS 140-2 compliant cryptography services.
EXPRESS Library	Provides support for the following EXPRESS Payload to ISS C&DH System Ethernet interfaces as defined in SSP 52000-IDD-ERP Rev N: Telemetry Generation (including health and status), Command Handling, Ancillary Data, PEP Bundle Request, PEP Procedure Execution Request, and Data Transfer over IP.
HOSC Login Application	Provides the capability to establish a login with the HOSC. The login session can be used across TReK applications (e.g. HPEG, Command).
HPEG Application	Provides access to HOSC Payload Ethernet Gateway (HPEG) services. This application has a graphical user interface. It provides the capability to request HPEG services. This includes selecting a ground node ID (if applicable), starting and stopping services, and enabling and disabling the HPEG Idle Check. Includes support for DTN. Updates to align with EHS 31 HPEG updates to support communication with a destination on a Visiting Vehicle or ISS.
HPEG Library	Provides an application programming interface to retrieve HPEG configuration and status information.
IONconfig Application	Provides the capability to generate ION configuration files and scripts. The scripts (Windows batch files and Linux shell scripts) can be used to start and stop ION. This application has a graphical user interface. Move to ION 3.6.2.

TReK 5.2.0 Content Continued

Software	Description
IONizer Application	Provides capabilities to start, stop, and monitor ION. This application has a graphical user interface. Move to ION 3.6.2.
IONizer Library	Provides an application programming interface to start, stop, and monitor ION. Move to ION 3.6.2.
Metadata Application	Provides the capability to define and manage metadata. Support for creating databases and metadata files and translating between different types of metadata formats. This application has a graphical user interface. Added support for switching, multi-syllable parameters, and formats.
PEP Ethernet Library	Provides support for Payload Software Interface Control Document Part 1, International Standard Payload Rack to ISS Document interfaces as defined in SSP 52050 Rev M.
Playback Application	Provides the capability to playback recorded data. This application has a graphical user interface. Added FIPS 140-2 compliant cryptography services.
Record Library	Provides an application programming interface to record data.
Telemetry Library	Provides an application programming interface to retrieve telemetry data. Core library is C++ with Release 3 compatible wrappers for ANSI-C and .NET.
TReK Help Application	Provides integrated help for all TReK applications and libraries. Updates.

TReK Beta Software Testing Program

- The TReK Beta Software Testing Program:
  - Provides an opportunity for you to test drive the TReK software and provide feedback to improve the product.
    - Feedback is accepted throughout the entire Beta Software Testing time period.
    - You can send input via an e-mail to trek.help@nasa.gov.
    - All input is entered, assigned a number, and tracked to resolution.
    - TReK Development Team will correspond with you on any input received via trek.help@nasa.gov.
  - Provides an opportunity for you to review TReK requirements and design.
    - This includes the opportunity to input RIDs.
    - See RID process on the following chart.
  - Provides early access to the TReK software.

Note: Due to export requirements, a HOSC Portal Account with access to the TReK Software Download area is required to participate in the TReK Beta Software Testing Program.

RID Process

- RIDs will be accepted from all participants
- RIDs can be submitted to trek.help@nasa.gov
- RIDs will be accepted between 5/9/2019 and 5/23/2019.
- RIDable Material
  - TReK Requirements included at the end of this package.
  - TReK Software Design included in TReK 0.10.0 Beta Software Package.
- RIDs will be accepted for:
  - Missing Requirement
  - Design Does Not Meet Requirement
  - Anything else – please send a comment to trek.help@nasa.gov.

Step	Description
1.	All RIDs will be entered, assigned a number, and tracked to resolution.
2.	Within approximately 2 weeks following the RID closure date, all RIDs are brought to a Review Board meeting in a RID disposition package.
3.	TReK Team coordinates closure of RID(s) with NASA Review Board Chair.
4.	TReK Team will coordinate RID responses with RID originators.

Device Requirements Added

3.2.1.1 Core Requirements

J. TReK shall provide the capability to generate an elliptic public and private cryptographic key pair.

K. TReK shall provide the capability to wrap/encrypt a private key using a user passphrase.

L. TReK shall provide the capability to decrypt packets received by a device.

M. TReK shall provide the capability to encrypt packets sent by a device.

N. TReK shall support the following cipher packages:

1. Advance Encryption Standard (AES) Galois/Counter Mode(AES GCM)
2. Advance Encryption Standard (AES) Counter with CBC-MAC (AES CCM)

O. TReK shall support the following cipher key sizes:

1. 128 bits
2. 256 bits

File Transfer Requirements Added

3.2.2.1 Core Requirements

P. TReK shall provide the capability to encrypt all Native CFDP Protocol Data Unit (PDU) packets.

Q. TReK shall provide the capability to decrypt all Native CFDP Protocol Data Unit (PDU) packets.

R. TReK shall provide the capability to encrypt a file using an encryption dropbox.

S. TReK shall provide the capability to decrypt a file using a decryption dropbox.

T. TReK shall provide the capability to fragment a file using a fragmentation dropbox.

U. TReK shall provide the capability to defragment a file using a defragmentation dropbox.

Data Requirements Added

3.2.6.1 Core Requirements

O. TReK shall provide the capability to define multiple sets of the following per parameter:

1. Calibration
2. Limits
3. Enumerations
4. Expected States

P. TReK shall provide the capability to select a set using the following conditions:

1. Ranges
2. Enumerations

3.2.6.2 User Interface Requirements

E. TReK shall provide a graphical user interface to start the following core services:

7. Data Decryption
8. Data Encryption

F. TReK shall provide a graphical user interface to stop the following core services:

7. Data Decryption
8. Data Encryption

Playback Requirements Added

3.2.5.1 Core Requirements

K. TReK shall provide the capability to forward playback packets.

L. TReK shall provide the capability to playback data from encrypted recorded data files.

M. TReK shall provide the capability to decrypt encrypted data during a playback.

N. TReK shall provide the capability to encrypt playback packets prior to be forwarded.

Metadata Requirements Added

3.2.11.1 Core Requirements

Q. TReK shall import metadata information about the following:

10. a limit alarm switch set from an XML file.
11. an expected state alarm switch set from an XML file.
12. a calibrator switch set from an XML file.
13. an enumerator switch set from an XML file.
15. a format collection from an XML file.

R. TReK shall export metadata information about the following:

9. a limit alarm switch set to an XML file.
10. an expected state alarm switch set to an XML file.
11. a calibrator switch set to an XML file.
12. an enumerator switch set to an XML file.
14. a format collection to an XML file.

Cryptography Key Generation Requirements Added

3.2.14.1 User Interface Requirements

A. TReK shall provide a graphical user interface to generate an elliptic public and private cryptographic key pair.

B. TReK shall provide a graphical user interface to wrap/encrypt a private key using a user passphrase.

External Interfaces Updated

3.1.1

The Telescience Resource Kit interfaces with the Enhanced Huntsville Operations Support Center System (EHS) to access EHS services as defined in the Payload to Generic Interface Definition Document (PGUIDD) [SSP 50305-V1-RevG and SSP 50305-V2-RevD].

The Telescience Resource Kit interfaces with the Interplanetary Overlay Network (ION) software using interfaces defined in the ION 3.6.2 documentation and software.